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HEAD START EVALUATION AND RESEARCH CENTER, THE UNIVERSITY OF CHICAGO. REPORT E, COMPARATIVE USE OF ALTERNATIVE MODES FOR ASSESSING COGNITIVE DEVELOPMENT IN BILINGUAL OR NON-ENGLISH SPEAKING CHILDREN.

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In order to assess the feasibility of alternative methods for determining the cognitive development of bilingual or non-English speaking children from a disparate cultural background, 28 Seminole Indian children from two Head Start centers were administered a series of intelligence tests, some based on verbal ability, some not. The tests used were (1) the Ravens Colored Matrices, (2) three Piagetian measures designed to assess the child's stage of concrete operations, (3) two measures of classificatory behavior (class inclusion and object sorting), and (4) the Stanford-Binet. The Ravens test purports to assess a person's present capacity for intellectual activity and has a minumum of verbal requirements. This test showed the least deficit for the Indian children and was a good predictor of the child's functioning on other tasks. The Stanford-Binet showed the children to be very deficient in intellectual ability. The children did poorly on the Piagetian measures, considerably below normative levels. On the sorting tasks, the Indian children scored below urban Negro children who had taken the same test. An appendix containing task descriptions follows this report. (WD)

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E. Comparative Use of Alternative Modes for Assessing Cognitive Development in Bilingual or Non-English Speaking Children

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Problem

As was indicated previously in the report on evaluation activites, the Seminole Indians comprised a unique sample. Program structure and child and classroom characteristics were at a high degree of variance with the Head Start programs in our other centers. Similarly, attempts to assess the children's cognitive development by means of the standard evaluation instruments were seriously hindered by the children's lack of facility with the English language and by sub-cultural differences in test behavior.

At the Big Cypress Center where the children understood some English but spoke it minimally, accurate basals on the Stanford-Binet could not be obtained for most of the youngsters during the initial testing. When the Caldwell-Soule was administered, the cultural bias of the verbal items increased their incomprehensibility. This was also true at the Hollywood Center where the children did speak English. For example, the standard reply to the question, "Which way does an elevator go?" was "in the water" (cf. alligator). With respect to differences in test-taking behavior, most of the Indian children tended to give minimal responses when asked for verbal rationales; on serial items they were likely to request approval before continuing, a condition not allowed on many items. When unwilling or unable to answer an item the child usually bowed his head or looked towards the floor, remaining so despite encouragement to respond until a new item was asked.

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The study being reported here was an exploratory attempt to assess the feasibility of alternative methods for determining the cognitive development of bilingual or non-English speaking children from a disparate cultural background.

Method

The subjects were twenty Seminole Indian children attending the Hollywood Head Start Center (C.A. 4-8 to 6-5) and eight Seminole Indian children attending the Big Cypress Center (C.A. 4-8 to 6-4). (For a description of these markedly different reservations, see the report on evaluation.* Subjects were administered the Ravens Colored Progressive Matrices, sets A, Ab and B, Form Board version; three Piagetian measures designed to assess the child's stage of concrete operations (conservation of volume and length and a dream interview) and two measures of classificatory behavior (class inclusion and an object sorting task). A month later, at the time of evaluation post-testing, 26 of the 28 subjects were administered the Stanford-Binet, Form LM according to the Wright short method. Except for six children (five of whom were six-year-olds), all subjects were in the evaluation sample.

The Ravens Colored Matrices is purported to assess a person's present capacity for intellectual activity, irrespective of his acquired knowledge. Sets A, Ab and B are arranged to assess mental development up to the stage when a person is sufficiently able to reason by analogy. Since the test was designed for use with young children and in anthropological studies as it can be used satisfactorily

*All children over $4\frac{1}{2}$ attending the Head Start classes during the time of testing were included in this study.

with anyone who cannot understand or speak English, it was considered especially appropriate for this study. The board form of the test is especially suitable for work with young children. Each problem is presented in the form of a board with a part removed and with six movable pieces each of which exactly fits the space in the board. The child can be shown that each piece fits the gap in the board but that only one completes the pattern. By placing a selected piece in position he sees the result of his judgment. As the manual points out, other advantages of the board form over the book form are that solutions by trial and error can be observed, recorded and compared with solutions by direct perception and inference. Moreover, it is possible to record easily and accurately the successive judgments a person acts on in attempting to solve a progressive series of problems. Its bright colors and the fact that it is untimed also make it more appealing for work with young children. In this study the subjects apparently understood the task with a minimum of verbal instruction. Most of them seemed to thoroughly enjoy being able to manipulate the attractive designs and remained attentive throughout the thirty-six items.

Instructions for the Piagetian tasks used are included in the Appendix. In order to make comparisons later with an urban Negro sample from varying socio-economic backgrounds, the same procedures were employed as used in the follow-up study of maternal influences upon cognition described in Research Report A. The administration and coding procedures were those developed by Dr. Lawrence Kohlberg. The tasks included various assessments of the child's capacity to distinguish external reality from subjective appearance under conditions of varying perceptual distortion. The tasks utilize objects with which most children have had physical experience, and

they allow nonverbal conceptualization. Consumables were used in the conservation tasks to facilitate the subject's involvement in making a correct choice. Although these tasks were first developed with white middle-class children, they were found to be meaningful also for 4-year-old Negro culturally disadvantaged children. Various stages of responses were represented within each task, as with the middle-class children, but the average stage of development was less advanced for the culturally disadvantaged child.

One of the most common ways of studying conceptual development has been the study of classificatory behavior. The Concept Sorting Task devised by Kohlberg (1963) consisted of having the child sort a set of eighteen dolls. Upon his recommendation, for this study we used a modified version consisting of fifteen human figure dolls, excluding the three nonhuman dolls in the original task. Instructions for the task are found in the Appendix. The sorting task allows for assessment of the sorting modes of the children and their verbalizations. In addition, a scale based on a three-stage sequence of concept formation proposed by Piaget is derived which incorporates an analysis of the sorting modes in relation to both extensional and intensional characteristics of the objects sorted. Previous work by both Kohlberg and Stodolsky (1965) indicated that the stages of concept formation measured by this task do have generalizability beyond the middle-class population on which it had been developed.

The modes of sorting measured by this task encompass a concrete to abstract (categorical) continuum, coupled with refinements to take into account extensional (generality) aspects of the concepts. Five modes of sorting are assessed by the task: associative, identity, descriptive, collective, and categorical. These modes of sorting

(with the exception of collective) were found to form a developmental or age-related sequence by Kohlberg (1963) They are discussed below in the developmental order found.

An associative sort is one in which the child places objects together for an idiosyncratic reason or one based on individual experience. For example, two objects are placed together because they "like each other." The sort is not based on any perceptual similarity between the objects and as such the sort does not form a class.

An identity sort is one in which two nearly identical objects are put together. The stimulus array consisted of objects which could be put in groups of three to form a category. For example, three boys and three girls were in the array. Each group of three contained two objects which were identical in terms of material, size, and color of dress. The third object in the class was made of different materials and of different size. If the child grouped the two nearly identical objects, his sort was considered to be "identity."

A descriptive sort was one based on perceptual similarities between the objects. For example, a child could place all dolls with blond hair or all dolls dressed in red together.

A collective sort was the formation of a family. At least a mother, a father, and one child had to be included.

A categorical sort was one in which the child formed a class including at least three objects. Sex, age, and sex-age were the possible criteria for a categorical sort in this task.

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The grouping of the dolls which the child made was recorded along with his response to a verbal probe as to why he made the sort. The scoring scheme utilized was Stoldolsky's modification of the original Kohlberg system to allow for completely independent scoring of the mode of the object sort and the verbalization. This was considered particularly important in light of the difficulties encountered with some of the children in eliciting verbal responses. An inter-scorer reliability estimate of the non-verbal scoring scheme produced 95 per cent agreement. The scoring for the verbalizations and the Guttman scale are those used by Kohlberg (1963) with only minor modification.

It was possible to obtain four interrelated scores from the sorting tasks: the Guttman scale score of concept formation, the Non verbal score, the Verbal score, and an average of the last two. These last three measures were obtained by weighting the percentage of each sort mode (1 for associative, 2 for identity, 3 for descriptive and collective, 4 for categorical).

## Results and Discussion

### Ravens Colored Progressive Matrices

For the Hollywood Center, the range of scores on the Ravens was 5-23 with a mean of 12.6. According to English norms for children of comparable age, the Indian children scored between the 10th to 93rd percentile, with the average score at the median for five-and-a-half-year-olds. Similarly, the subjects from the Big Cypress Center obtained scores ranging from 6-21 (5th to 93rd percentile) with a mean score of 12.5. The mean C.A. for the group was 66 months so that a score of 12.5 would be at the median.

In contrast, the Stanford-Binet I.Q.s obtained ranged from 66-117 (2nd to 92nd percentile), with a mean of 86 (17th percentile) for the Hollywood Center and from 39-90 (.1 to 17th percentile) with a mean of 71.8 (3rd percentile) for the Big Cypress Center. The correlation between the two tasks was -.20 for Hollywood and .52 for Big Cypress.

As a measure of the child's present clarity of observation and level of intellectual development, the Ravens appears to provide greater differentiation among the Indian children than does the Stanford-Binet. Although not a test of general intelligence, Sets A, Ab, and B do indicate whether the subject is capable of forming comparisons and reasoning by analogy; and if not, to what extent, relative to other people, he is capable of organizing spatial perceptions into systematically related wholes and analyzing them into their components. A few of the younger children exhibited what Ravens refers to as "passive perception", reacting to the figures as presenting no problem. Most, however, if not perceiving the logical solution by analogy, tended to attempt to repeat a pattern in the design.

Due to the Indian children's unwillingness and/or inability to answer verbal items, it was expected that there would be a reduced relationship between the Binet and Ravens. Although previous research findings have given varied and conflicting estimates of the degree and direction of the relationship between the Binet and Ravens, a negative correlation for the English-speaking Indian children was quite unexpected. Considering the small sample size and error of measurement, such a result can provoke only increased effort toward further research to explore the underlying processes involved. Since the sequence in which the problems are presented in the Ravens test provides training

in the method of thinking, one might look at the child's performance as a measure of his ability to utilize the training offered. Thus, a child obtaining a low score on the Binet may be one whose environment has provided him with a limited fund of knowledge. His Ravens score, however, may indicate his ability to think logically given the appropriate stimulus cues.. In contrast, a child may have received the culturally expected school-relevant knowledge but not have been encouraged in those activities facilitating the development of abstract thinking. Since the Ravens is reported to be more susceptible to present fluctuations in motivation, fatigue, illness, et cetera, the interval between administration of the Ravens and Binet would also act to lower the correlation. Another suggested causal factor is a reduced intercorrelation due to emotional instability. During our several visits to the Hollywood Center it was informally observed that in contrast to our other Head Start samples, many of the children showed speech hesitancies and stammering, and the majority bit their nails or kept their fingers in their mouth during testing. It has generally been found that children with emotional problems show a greater discrepancy between measures of acquired knowledge and present functioning. Item analysis of the Binet may yield further clues concerning the obtained relationship. Informal inspection of the data indicated that many of the Indian children performed best on the perceptual discrimination items; success or failure on these items may be positively related to performance on the Ravens.

Conservation of Length and Volume

The results for these tasks are being considered together since the data are highly similar. As indicated above, on these tasks the

child was asked to distinguish external reality from subjective appearance under conditions of varying perceptual distortion. The brightly colored gum sticks and the beakers of Coke seemed highly attractive to the children, and they appeared eager to do what was required to obtain them.

With the possible exception of two children, none of the Indian children could be considered conservers on these measures. Although almost all the children indicated by their responses that they discriminated the length of the straws, only two Hollywood subjects (a boy and a girl aged 5-4) conserved when the short straw was advanced towards them. Six other Hollywood children conserved when the straw was bent, but only one child, the five-year-old boy, conserved consistently nonverbally. Out of 28 subjects, only eleven offered any reasons for their responses, but all were non-conserving rationales (e.g., "because you moved it", "it growed"). On the liquid conservation task, which usually has been found to be more difficult, only two subjects consistently conserved (the same boy who conserved on the length conservation task and another five-and-a-half-year-old boy from the Hollywood Center), although seven subjects conserved with help. Twelve of the children might be considered partial conservers, but they also may have merely perseverated on the unpoured glass. Again, no conserving verbal rationales were given; instead, the children referred to the glass size, height of the liquid, or to the fact that the experimenter poured it. Even though on the memory question the children indicated they remembered how the beakers were before pouring, they still said the amount of liquid or beakers had been changed.

For this small sample, then, the Indian children, especially those

living on a remote reservation, were considerably retarded in their stage of cognitive development as assessed by these measures. They performed considerably below the level usually reported for children in this age range on the length conservation task. In comparison with our findings for 5½ to 6-year-old urban Negro culturally disadvantaged children they also were less able to conserve on the liquid conservation task. In the latter case, however, the difference, though in the same direction, was not statistically significant. As had been found in previous research, one could not predict the child's stage of concrete operations from his performance on the Binet. These tasks measure different aspects of cognitive functioning. In contrast, the children who made consistent conserving choices performed above the 75th percentile on the Ravens.

Dream Interview

Many of the children were unable or unwilling to report dreams. However, with considerable urging they did respond to further questioning and to the monkey prompt described later in the protocol. Although most subjects indicated they knew what a dream was, only three seemed fully aware that a dream is not real and thought that dreams took place inside. None scored at a higher conceptual level. Most of the Indian children reported dreams came from Jesus. There were many response inconsistencies, with children scoring minus on question 3 but plus on questions 4 or 5. For this sample the items did not scale.

The data for this task are consistent with previous findings indicating that the five- to six-year-old expresses modified realism concerning dreams. Most of the Indian children, although stating that dreams had an internal origin or occurred within them, seemed uncertain

about internality and contradicted it or ignored it in later parts of the protocol. Kohlberg had found this stage representative for children aged 5-8 and Pinard and Larendeau for children aged 5-0. Although subjective or interiorized replies were offered with more certitude, there was still confusion between the external and internal nature of a dream for Kohlberg's group at 6-0 and for Pinard and Larendeau's subjects at 5-8. All subjects in this study who responded correctly for scale item 6 and above obtained an I.Q. above 90 on the Stanford-Binet. Except for one child they also scored above the median on the Ravens.

Class Inclusion

The class inclusion data suggest considerable need for revision of this procedure as it is highly dependent on the child's verbal facility. The task seemed a semantic rather than a conceptual problem. Although most of the children made the initial discrimination of placing all candies and all chocolates in the experimenter's hands, they were inconsistent or completely failed the following items. "Some" or "any" was too difficult a concept and tended only to confuse them. Subjects tended to answer "yes" to all items suggestive of a switch from task-orientation to experimenter-orientation as the task became more meaningless for them. Only three children were consistent at the beginning in saying there were more candies, although eight children who said there were initially more chocolates than candies changed their response in the process of questioning. As was the case with the previously discussed tasks, none of the children were able to state a conserving rationale for their choices. The two boys who consistently differentiated correctly between chocolates and candies, although obtaining Binet I.Q.s of 78 and 90, both scored above the 90th percentile on the Ravens.

Object Sorting Task

Four measures were derived from the Kohlberg Sorting Task. Each child was given a scale score which incorporated the ratings of the child's sort according to properties of sorting which Piaget had observed. The scale attributes may be found in the Appendix. The highest sort scale achieved in this sample was six, the lowest zero, with the majority obtaining a three. This is to be expected as the scale is applicable through age eight. The qualitative types of sorts which the children made (associative, identity, descriptive, collective and categorical) were used to form a nonverbal and verbal score. These sorting modes were weighted according to their developmental order. The nonverbal sort score refers to the children's object sorts. The verbal score is an index of their verbalizations about the object sorts. Finally, an average of the verbal and nonverbal scores was available.

The modes of sorting analysis was based on the work of Kagan, Rapaport, Sigel and others and incorporated a concrete to abstract dimension of development. Since the scale score and the scores of the modes of sorting hierarchy had been found to correlate quite highly, Kohlberg concluded that "the findings of students in the Rapaport and Goldstein framework are applicable to Piaget's theory if abstract concept formation reflects attainment of Piaget's operational stage" (Kohlberg, 1963, p. 129). Thus, the scores derived from the sorting task may be viewed as alternate formulations of highly similar phenomena. However, because of our subjects' known difficulty in verbalizing rationales, a means of scoring the nonverbal behavior of the children independent of their verbalizations was

necessary. This was confirmed by the lack of relationship obtained between the nonverbal and verbal scores ($\underline{r}$ = .20 for the Hollywood $\underline{Ss}$ and zero for Big Cypress $\underline{Ss}$). Similarly, although the nonverbal score was highly correlated with the scale score ($\underline{r}$ = .92 for Hollywood and .94 for Big Cypress), the verbal score was essentially unrelated to the scale score ($\underline{r}$ = .19 for Hollywood and zero for Big Cypress). These results reflect the fact that the majority of subjects did not express rationales for their sorts. It should also be noted that for this sample the items did not consistently scale. Some subjects used all objects but gave predominantly associative responses; others were able to use complementary classes as requested in question 2, but did not include all members of a class in more than 50% of spontaneous groupings.

Table 1 contains the summary statistics for these two Centers on these sorting measures in addition to those for Stodolsky's urban Negro sample of five-year-olds.

TABLE 1
MEAN SORTING SCORES FOR TWO ETHNIC PRESCHOOL GROUPS

| SAMPLE | N | SCORES | | | |
|---|---|---|---|---|---|
| | | NONVERBAL | VERBAL | AVERAGE | SCALE |
| Seminole Indians | | | | | |
| Hollywood | 20 | 215.66 | 86.68 | 151.17 | 2.95 |
| Big Cypress | 8 | 112.49 | 0.00 | 56.24 | 1.12 |
| TOTAL | 28 | 164.08 | 43.34 | 103.70 | 2.04 |
| Urban Negro | | | | | |
| Upper-Middle | 20 | 263.11 | 281.67 | 272.61 | 3.83 |
| Upper-Lower | 20 | 261.37 | 256.53 | 259.16 | 3.58 |
| Lower-Lower | 20 | 217.37 | 176.68 | 197.37 | 2.89 |
| TOTAL | 60 | 247.00 | 237.52 | 242.52 | 3.43 |

Consistent with the findings reported earlier, the Indian children tended to perform somewhat below the level expected for their age group. Several children in both Centers were unable or unwilling to sort the dolls after repeated urging. Although the data from the Hollywood Center are similar to those for the lower-lower class Negro sample with respect to the nonverbal and scale scores, the Indian children scored particularly low on the verbal measure. The discrepancy between the verbal and nonverbal modes for both Centers was highly significant. Similarly, the discrepancy for the lower-lower class Negro sample approached statistical significance. These children, though performing at a low level in general, performed much more adequately in the physical manipulation of the dolls. This is consistent with the finding that one of the most severe difficulties of culturally disadvantaged children is their inability to verbalize, more specifically, to answer questions. As was the case with their performance on the other tasks, striking differences were found between the Hollywood and Big Cypress groups, with the rural Indian children performing at a much lower level. Even with directions given in Miccosukee the Big Cypress subjects seemed to find the task too difficult.

Also of interest is the distribution of the sorting modes used by this sample. Table 2 contains the percentage of each sorting mode used by this Indian sample of Head Start youngsters. It also contains the average percentage of responses made by Kohlberg's four- and five-year-olds (unfortunately, the verbal and nonverbal

scores on his sample were not available) and the percentage of each sorting mode used by Stodolsky's urban Negro sample of five-year-olds.

TABLE 2
MEAN PERCENT USE OF EACH SORTING MODE BY THREE ETHNIC SAMPLES

| SAMPLE | ASSOCI-ATIVE | IDEN-TITY | DESCRIP-TIVE | COLLEC-TIVE | CATE-GORICAL | NO VERBAL-IZATION OR SORT |
|---|---|---|---|---|---|---|
| Seminole Indians | | | | | | |
| Nonverbal Sorts | | | | | | |
| Hollywood | 22 | 30 | 5 | 1 | 29 | 14 |
| Big Cypress | 22 | 9 | 0 | 4 | 15 | 50 |
| Total | 22 | 20 | 2 | 2 | 22 | 32 |
| Verbal Sorts | | | | | | |
| Hollywood | 6 | 14 | 7 | 0 | 8 | 65 |
| Big Cypress | 0 | 0 | 0 | 0 | 0 | 100 |
| Total | 3 | 7 | 4 | 0 | 4 | 82 |
| Stodolsky (Urban Negro) | | | | | | |
| Nonverbal Sorts | | | | | | |
| Upper-Middle | 17 | 32 | 18 | 4 | 29 | -- |
| Upper-Lower | 20 | 30 | 16 | 2 | 32 | -- |
| Lower-Lower | 37 | 27 | 16 | 2 | 18 | -- |
| Total | 24 | 30 | 17 | 3 | 26 | -- |
| Verbal Sorts | | | | | | |
| Upper Middle | 15 | 13 | 33 | 5 | 33 | 2 |
| Upper-Lower | 25 | 13 | 24 | 1 | 32 | 4 |
| Lower-Lower | 19 | 5 | 30 | 1 | 14 | 31 |
| Total | 20 | 11 | 29 | 2 | 26 | 12 |
| Kohlberg average (Urban white) | | | | | | |
| Five-year-olds | 12 | 35 | 18 | 13 | 21 | -- |
| Four-year-olds | 62 | 27 | 10 | 2 | -- | -- |

In general, the responses of this sample and those of Stodolsky's lower class urban Negro sample are similar when considering only the nonverbal scores. Although our sample contains children over $5\frac{1}{2}$ years old, their performance appears to lie somewhere between that of Kohlberg's four- and five-year age groups. Again we find the Indian children, especially those living on a remote reservation, to be performing at a less advanced stage of cognitive functioning for their age group.

The three samples reveal an interesting difference in regard to the collective (family) sort mode. Initially, Kohlberg (1963) felt that this type of sort was a "slight advance" conceptually beyond an associative response in which relationships between people are the defining characteristics. His age trends, however, led to placement of the collective mode just beyond the descriptive mode. In our data, as in Stodolsky's data, the collective mode virtually drops out. We can only speculate as to why this difference occurs. If the age trends observed by Kohlberg are correct, then we would expect the collective mode to appear more frequently as this sample gets older and assume that they are slightly behind the Kohlberg sample in this regard. This would not be inconsistent with the other figures in the table. However, alternative interpretations are possible. It may be psychologically significant that a white sample of children produced collective sorts while a Negro and Indian sample did not. It may be that either the white color of the dolls or other psychological factors inhibited the production of collective responses in these groups. The less stable family patterns in these communities might make this a more affect-laden response for these children.

Conflicting data emerge when comparing performance on the various tasks utilized in this study. A score of 4 or higher on the sorting scale is considered to be a high level of thought for a five-year-old. Kohlberg (1963) found that 33 per cent of his middle-class five-year-olds achieved this level. Thirty-eight per cent of Stodolsky's sample reached that level. Consistent with their poorer performance only 17 per cent of the Hollywood subjects (CA 5-6 to 6-4) and none of the Big Cypress subjects reached that level. For three of these children, Binet I.Q.s ranged between 78 - 82, with Ravens Scores above the 75th percentile. The fourth subject performed very poorly on the Ravens (below 10th percentile), but obtained an I.Q. of 117 on the Stanford-Binet. None of these subjects had nonverbally conserved on the length and volume measures or obtained a high scale score on the class inclusion task; only one of them obtained a relatively high scale score for his dream responses. Thus we find a suggested separation of classificatory behavior from other types of cognitive functioning.

As the data in Tables 1 and 2 reflect, no child with inadequate language development performed at a high level of sorting. The marked difference in results for the Hollywood and Big Cypress samples is additional support for the idea that language is a <u>necessary</u> condition for high level thought in the child. Language is not a <u>sufficient</u> condition for high level thought in the child, however. This may be seen by the fact that children within the adequate language group at Hollywood with Binet I.Q.s above 90 performed at both high and low levels on the sorting task. Thus, after minimum language has been obtained, there are still other factors which enter into determining the child's level of thought. Prior to the attainment of minimum language, it

does not seem possible for the child to move to high level thought. Similarly, Stodolsky (1965) found that all her subjects who were categorized as low language on the Peabody were categorized also as low on thought using the verbal or nonverbal sort measures. She also obtained a large difference in nonverbal and verbal behavior in the low language group reflecting the fact that many of these children were unable to give reasons for their sorting or gave associative ones. Both sets of findings are consistent with the theory of language and thought proposed by Vygotsky (1962) and Luria (1959). These investigators demonstrated that the acquisition of speech is a prerequisite to self-regulation of behavior. Viewing both language and thought as developmental processes, they found language development to be developmentally prior to certain levels of conceptualization.

## Conclusions

As was emphasized in the beginning, this was an exploratory study. The smallness of the sample size makes it subject to large chance fluctuations. Consequently, the findings must be regarded as highly tentative.

Considering the above-mentioned cautions and the absence of a counterbalanced order of presentation for the various tasks, one hesitates to make inter-task comparisons. Nevertheless, the data do tend to support the utilization of a variety of measures for assessing cognitive development rather than a single measure of general intelligence. This enables one to differentiate the individual's level of acquired knowledge and his present modes of problem-solving, thereby facilitating individually-oriented educational planning.

With the exception of the class-inclusion measure, the present tasks can be recommended for their motivational properties and ability to hold the young child's fluctuating attention. One is more likely to obtain an accurate assessment of the child's level of functioning with a task he enjoys and feels he comprehends. Although we attempted to minimize verbal requirements in order to reduce the confounding of expressive difficulties with conceptual ones, we were only partially successful. In future studies employing Indian children as subjects, we hope to reduce further the demands for verbal response by modifying present procedures and adding new measures. It should be noted that the Ravens, which required a minimum of verbal response, showed the least deficit for these children. It also tended to be a better predictor of the child's functioning on other tasks. As discussed further below, adjusting to the child's inability or reluctance to answer questions by emphasizing nonverbal responses does not, however, eliminate decrements due to linguistic difficulties.

The data were consistent in indicating a less advanced stage of cognitive development for the Indian children. Moreover, those subjects living under the more restricted, impoverished conditions in effect on the Big Cypress reservation performed considerably poorer. In the absence of stimulation the development of logical thinking appears to develop later. These results are consistent with previously reported findings on the effects of cultural disadvantage on intellectual functioning.

Future studies, in addition to attempting to replicate the present findings with a more adequate sized sample, should focus on delineating the nature of the environmental variables affecting these responses.

The results for the sorting tasks in particular suggest that language impoverishment is contributing to this retardation in cognitive growth. Previous research by this investigator (1965) has shown the interfering effect of a restricted language environment upon cognitive performance, especially in the area of categorizing behavior. The processes which theory dictates as essential for language learning are: 1) exposure to an adequate language model, 2) opportunity for practice and 3) corrective feedback. Further research is needed to study the extent to which the Indian child's behavior is mediated by verbal cues which offer opportunities for using language as a tool for labelling and ordering stimuli in the environment. In addition, the development of thought and cognitive processes of problem-solving might be fruitfully studied through analysis of the communication styles evolving from the structure of the Seminole Indian social system and the structure of the family.

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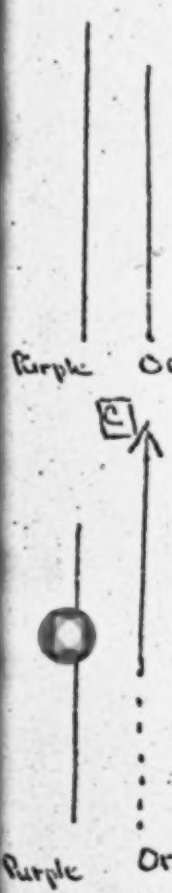
# APPENDIX TO RESEARCH E - TASK DESCRIPTIONS

PRE-SCHOOL PROJECT, SUMMER 1967



Code Sex Age Date Tester

Materials: 4 pairs of 4" and 4½" gum sticks. Three pairs are 2 colors, 1 pair is 1 color.




1. (One orange 4" and purple 4½", placed parallel to child's line of sight, with ends farthest from child aligned)
Here are two sticks One is bigger and longer than the other You don't need to show me, but can you see that one is bigger and longer than the other?

Yes No

When I say so, you can pick the bigger and longer. One is to keep or chew If you don't pick the biggest one, you won't get gum this time. You'll get another chance to get gum later. Before you pick I put them like this (Place finger in center of orange stick and slide it toward child so that it extends about ½" beyond other stick.)

Now, look at them If you can show me the biggest and longest one, I'll give it to you to chew after while

_____picks longer purple (Let child take gum and then move to Q3)

_____picks shorter orange (Ask the following and then move to Q2)

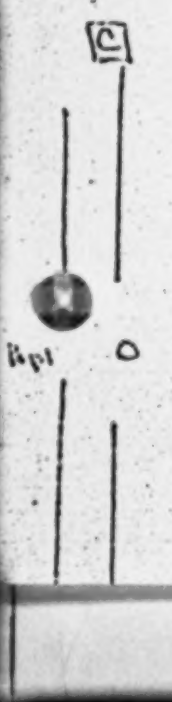
How could you tell it was bigger?

(If says "I looked at it," or I saw this was biggest," or similar ambiguous response which could refer to remembrance of which was bigger prior to advance, then ask following Q:)

When did you see it (look)?

(If says "I measured," or demonstrates by measuring, replace in advanced position and ask following Q:)

But how can you tell when its like this?




2. (Give this question only if child picked shorter orange on Q1)
(If sticks have been moved so that orage stick is not advanced toward child, replace them in this postion)
You told me this was the biggest one (point to orange)
(Place finger in center of purple stick and move it toward child so that it ext about ½" beyond other stick)
Now show me the big one.

_____picks longer purple (move to 2a)

_____picks shorter orange (move to 2b)

a. (If chose longer purple in 2 above. Replace sticks in original position, with ends farthest from child aligned, and then move orange stick toward child so that it extends $\frac{1}{2}$" past purple)

Before you said this (point to orange) was biggest.

(Move purple stick toward child so that it extends $\frac{1}{2}$" past orange)

Now you say this (point to purple) is bigger. Do they really change bigness?

How is that (How does that happen)

(Move to Q5)

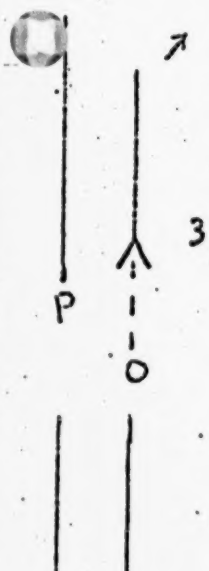
b. (If shorter orange was chosen in 2 above. Move orange stick toward child so that ends of stick farthest from child are aligned)

You said this was biggest (point to orange). Is it biggest now?

Do they really change bigness?

How is that (ie, how does that happen?)

(Move to Q5)



3. (Give this Q only if child picked longer purple on Q1)

(Take two other sticks of gum, one $4\frac{1}{4}$" pink, one 4" purple. Place them parallel to child's line of sight, with ends closest to child aligned)

Here are two more sticks of gum. One is bigger and longer than the other. You don't need to show me, but can you see that one is bigger and longer then the other?

Yes No

When I say so you can pick the bigger and longer one to keep or chew. If you don't pick the biggest one, you won't get gum this time. You'll get another chance to get gum later. Now before you pick, I put them like this.

(Place finger in center of purple stick and move it away from child so that it extends about $\frac{1}{2}$" beyond the pink stick.)

Now look at them. If you can show me the biggest (and longest) one, I'll give it to you to chew after a while.

_____picks longer pink stick (move to Q4c after asking the following Q)

_____picks shorter purple stick (move to Q4 after asking the following Q)

How could you tell it was Bigger?

(If says "I looked at it," "I saw this was biggest," or similar ambiguous response which could refer to remembrance of which was bigger prior to advance, ask:)

When did you look (see it)?

4. (Start here only if picked shorter purple on Q3)
(If pieces have been moved so that purple stick is not advanced away from child, replace in this position)

You told me this (point to purple) was the biggest one. (Place finger in center of shorter purple stick and move it toward child so that it extends $\frac{1}{2}$" beyond other stick)

Now show me the big one

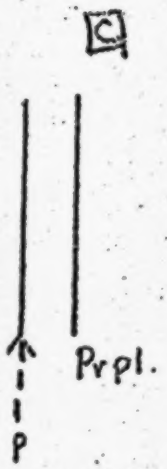
_____picks longer pink

(Replace sticks in original position, with ends closest to child aligned, and then, while talking, move purple away from child) Before you said this (pt. to purple) was biggest. Now (move pink stick so it extends $\frac{1}{2}$" beyond purple) you say this (pt. to purple) is bigger. Do they really change bigness?

How is that? (ie, how does that happen)

(Move to Q5)

_____picks shorter purple

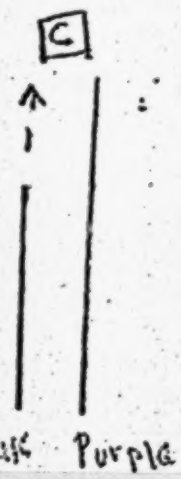



b. (Move pink stick toward child so that ends of sticks close to child are aligned)
You said this (pt. to purple) was biggest. Is it biggest now?

Do they really change bigness?

How is that?

<u>Move to question 5</u>




c. (Point to pink stick) This follows Q3 if said long pink was biggest.
You said this is biggest.
(Place finger in center of short purple stick and move it toward child so that the end nearest the child extends $\frac{1}{2}$" beyond other stick)
Now show me the big one.

_____Picks longer pink stick: (move to Q 5)

_____Picks shorter purple stick (move to 4D)

d. (Replace sticks in original position, with ends closest to child aligned.) Before (move purple away from child so it extends $\frac{1}{2}$" beyond pink) you said this (point to pink) was biggest.
Now (move purple toward child so it extends $\frac{1}{2}$" beyond pink at end closest to child) you say this (point to purple) is biggest. Do they really change bigness?

How is that? How does that happen?

Move to Q5

5. (One 4" pink, one $4\frac{1}{4}$" orange placed parallel to child's line of sight, with ends aligned in accordance with which way he is seeing illusion, i.e., if incorrect and picked orange on Q 1, align ends farthest from child; if incorrect on 3 and picked purple, align ends closest to child; if correct on 1 and 3, align ends closest to child if boy and farthest if girl)

Here are two candy sticks. See, one is bigger, one is longer? When I say so, you can pick the bigger one to keep or to eat. If you don't pick the biggest one, you won't get gum this time. You'll get another chance to get gum later.. Now, before you pick, I put them like this. (Bend orange stick so that a straight line drawn from end to end would be about 3 3/4" keeping alignment at one end with straight stick and not picking up from table.)

Now look at them. If you can show me the biggest one, I'll give it to you to eat after while.

_____Picks correct orange

_____Picks incorrect pink

Go to Q6, All Children.

6. (One 4" , one $4\frac{1}{4}$" of the same color, randomly arranged, non-parallel) Here are two gum sticks. Show me the bigger one.

_____Picks longer stick

_____Picks shorter stick

_____Measures

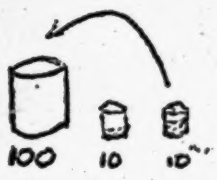
Show me how you can tell which is bigger.

How can you make sure?

code sex age date tester

Materials: 1 100 ml beaker, 2 10 ml beakers, 1 5 ml graduate, 2 10 ml graduates one of which has been cut down at the top, ½ cup coke or liquid.

Seat child so that table top is at eye level.




1. (Two 10 ml beakers and one 100 ml beaker)
Now I'm going to put some coke in these glasses. After a while we'll drink some. (Pour coke in both 10 ml glasses, with more in one). You don't need to show me, but can you see I put more coke in one glass than the other?

_____ Yes

_____ No

When I say so, you can pick the one with more to drink. If you don't pick the one with more to drink, you won't get any this time. You'll get another chance to drink some later. Now, before you pick, I take this one (10 with more coke) and pour the coke all out into this one (100 ml beaker). Now look at them. (Pause). If you can show me the one with more to drink, I'll give it to you to drink.

_____ Picks correct 100 (ask Q's below)

_____ Picks incorrect 10 (ask Q's below)

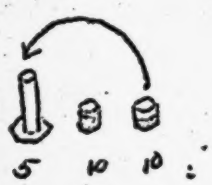
Did that one have more?

How could you tell?

(If says because empty was more:) But how can you tell now when it's like this (pointing to 100)?

(If says because it was more:) When was it more?

(Let child drink coke in glass he chose.)




2. (Two 10 ml beakers and one 5 ml graduate)
Now let's fill these two glasses. Now I fill this glass (one of 10's) up to the very top. I don't fill this (other 10) glass up. Now, see, I put more coke in one glass than the other. You don't need to show me but can you see that one glass has more coke?

_____ Yes

_____ No

When I say so, you can pick the one with more to drink. If you don't pick the one with more to drink, you won't get any this time, but you'll get another chance to drink some later. Now, before you pick, I take this one (10 with lesser amount) and pour the coke all out into this one (graduate). Now look at them. (Pause). If you can show me the one with more to drink, I'll give it to you to drink.

_____ Picks correct beaker(Aak Q's below; then let child drink and go to 2a)

_____ Picks incorrect graduate (Ask Q's below; then move to Q 3 or 4)

Does that have more?

How could you tell?

Show me how you could be sure?

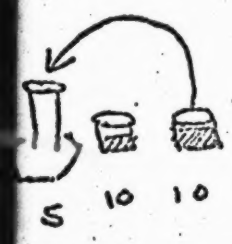
(If says because empty had less:) But how can you tell when it's like this (pointing to grad)?

(If says because it was more:) When was it more?

(If picked correct beaker, let child drink.)

(If incorrect on both Q 1 and 2, don't let child drink yet. Move to Q4.)

2a (If correct on Q 1 and correct on Q 2:)




(Two 10 ml beakers and one 5 ml graduate)
Now let's pour some more coke. Now I fill this glass (one of 10's filled to just below top of white dot). But I don't fill this (other 10) glass up. Now, see, I put more coke in one glass than the other.
You don't need to show me, but can you see that one glass has more coke?

_____ Yes

_____ No

When I say so, you can pick the one with more to drink. If you don't pick the one with more to drink, you son't get any this time, but you'll get another chance to drink some later. Now before you pick, I take this one (10 with greater amount) and pour the coke all out into this one (graduate). Now look at them. If you can show me the one with more to drink, I'll give it to you.

_____ Picks correct graduate (ask Q's below, then let child drink)

_____ Picks incorrect beaker (ask Q's below, go to 2b)

Does that have more?

How could you tell?

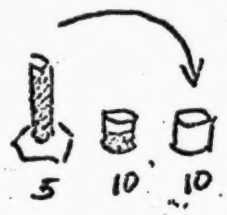
Show me how you could be sure?

2b. (If incorrect on 2a)
Which one had more before I poured it?

_____ Picks correct empty beaker

_____ Picks incorrect beaker with coke

Now, this one (point to graduate) has more coke in it. This one (point to beaker with less coke) has less. See (pouring graduate back into beaker), it's more. Then this (pointing to beaker with more) has more. Now, I pour it back (pour from beaker with more into graduate). Now look at them (pause). Now, you take the one with more coke to drink.

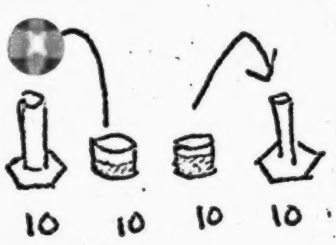



_____ Picks correct graduate (let child drink choice and terminate test)

_____ Picks incorrect beaker (ask Q's below)
Does it really get to be less when I put it in here (point to graduate)? How does that happen?

(Let child drink his choice and terminate test.)

3. (If picked correct 100 on Q 1 and incorrect graduate on Q 2:)




(Two 10 ml beakers and two 10 ml graduates, one of which has been cut to a shorter height) Now let's pour some more coke. (Pour coke into two 10 ml beakers, with more in one) Can you see that I put more coke in one glass?

_____ Yes

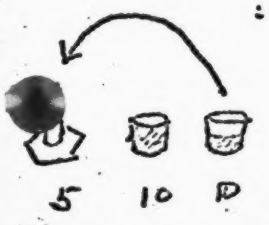
_____ No

When I say so, you can pick the one with more to drink. If you don't pick the one with more to drink, you won't get any to drink this time. You'll get another chance to drink some later. Now, before you pick, I take this one (10 with less) and pour it into this one (taller graduate), and I take this one (10 with more) and pour it into this one (shorter graduate). Now look at them. (Pause) If you can show me the one with more to drink, I'll give it to you to drink.

_____ Picks correct short graduate (ask Q below)

_____ Picks incorrect tall graduate (ask Q below)
Did you pick the one with more to drink?

(Let child drink)




a. (Two 10 ml beakers and 5 ml graduate)
Now let's fill these two glasses. Now I fill this glass (one of the 10's) up to the very top. I don't fill this (other 10) glass up. Now, see, I put more coke in one glass than the other. Can you see that one glass has more coke?

_____ Yes

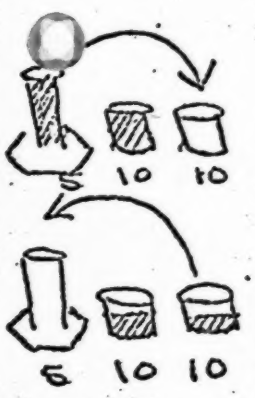
_____ No

When I say so, you can pick the one with more to drink. If you don't pick the one with more to drink, you son't get any this time, but you'll get another chance to drink some later. Now, before you pick, I take this one (10 with lesser amount) and pour the coke all out into this one (graduate). Now look at them. (Pause). If you can show me the one with more to drink, I'll give it to you to drink.

_____ Picks correct beaker (Let child drink)

_____ Picks incorrect graduate (go to Q4)

4. (If picked incorrect graduate:) Which one had more before I poured it?




_____ Correct 10 with coke

_____ Incorrect empty 10

See, this one (point to beaker) has more coke in it. This one (point to graduate) has less. See (pouring graduate back into beaker), it's less. Then this (pointing to beaker with more) has more. Now I pour it back (pour from beaker with less into graduate). Now look at them. (Pause). Now, you take the one with more coke to dring.

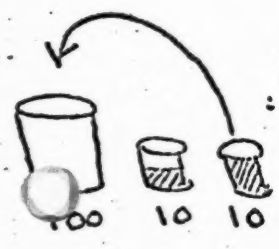
_____ Picks correct beaker (Let child drink)

_____ Picks incorrect graduate (Ask Q following)
Does it really get to be more to drink when I put it in here (point to graduate)?

How does that happen?

(Let child drink his choice.)

5. (If picked incorrect 10 ml beaker on Q 1:)




Two 10 ml beakers and one 100 ml beaker)
Now let's put some coke in these galsses. (Pour coke in both 10 ml beaker with more in one.) You don't need to show me, but can you see that I put more coke in one glass than the other?

_____ Yes

_____ No

When I say so, you can pick the bigger one to drink. If you don't pick the one with more to drink, you won't get any this time. Now, before you pick, I take this one (10 with more) and pour the coke all out into this one (100 ml beaker). Now look at them. (Pause). If you can show me the one with more to drink, I'll give it to you to drink.

_____ Picks incorrect 10 (Go to Q 6)

_____ Picks correct 100 (Ask Q's below)

How could you tell?

(If say empty had more): But how could you tell when it's like this (point to 100)?

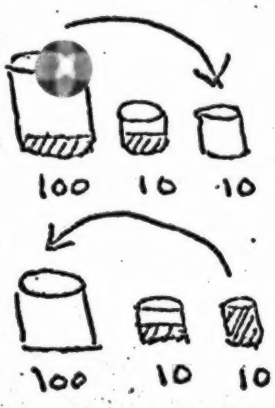
(Let child drink and terminate test)

6. (If picked incorrect 10 or Q5:)

Which one had more before I poured it here (point to 100)?

_____ Correct empty 10

_____ Incorrect 10 with less




See, this one (point to 10 with less coke) has less to drink. See, (pouring coke from 100 ml beaker back into 10 ml beaker) this is more. Now, I pour it back (pour from 10 with more into 100). Now look at them. (Pause). Now, you take the one with more coke to drink.

_____ Picks correct 100 (Let child drink).

_____ Picks incorrect 10 (Ask Q's below)

Does it really get to be less to drink when I put it in here?

How does that happen?

(Let child drink his choice.)

PRE-SCHOOL PROJECT, Summer 1967



code sex age date tester

Materials: 4 brown M&M's, 1 white mint

1. Look, here is some candy. Some are chocolate candy, (give child an extra chocolate M&M to eat). One is mint candy (give child extra mint to eat).

   Are these chocolate candy? Yes No
   Is this mint candy? Yes No

   Now I'm going to have you pick some, and you must pick the most you can. If you don't pick what has more to eat, you won't get any candy this time. Now, pick either all the chocolate or all the candy. Which has more to eat?

   Candy Chocolate

   Why did you pick that?

   Which are there more of, chocolate or candy?

   Why is that?

2. Put all the candy in my hand. Correct Incorrect

   Put all the chocolate in my hand. Correct Incorrect

3. Is all the candy chocolate? Correct No Incorrect Yes

   Is all the candy mint? Correct NO Incorrect Yes

   Is some of the candy chocolate? Correct Yes Incorrect No

   Is some of the candy mint? Correct Yes Incorrect No

4. a. Now, listen carefully. If you took some of the chocolate away, would there be any chocolate left?

   Yes No

   b. If you took all of the chocolate away, would there be any chocolate left?

   Yes No

   c. If you took all the chocolate away, would there be any candy left?

   Yes No

   d. If you took all of the candy away, would there be any chocolate left?

   Yes No

5. Then is there more candy or more chocolate?

Why do you say there is more_____?

6. What kind of candy is here?

7. You take either all the candy or all the chocolate, whichever is more.

All Candy Chocolate Mint

Dream Interview

Code Sex Age Date tester

Introduction:

"You know what a dream is, don't you? Do you dream sometimes during the might?"

"Can you have a dream if you stay awake and don't go to sleep?"

(If he says he does not dream, go on to 5)

(If he says he dreams, ask:)

"What did you dream about last time: tell me a dream you had."

"What happened after the dream was over? What did you think and do?"

3. a. "What happened to the (object) after you woke up? Where did it go; where was it after you woke up?"

(If it disappeared ask:) "Could you see it leaving?"

(If it hadn't disappeared ask:) "Could you see it when you woke up?"

"When you see a dog in a dream, is it the same as when you are awake at night and see a dog?"

2. a. What is this? (picture of a dog)_____

Is this a real dog you see here, or is it a picture, just something that looks like a dog?

(If real:) Can this dog you see here bark or run?

3. c. Was the (object_____) you saw in your dream just pretend, just something that looked like a (object), or was it a real (object)?

3. d. Was the (object) in your dream really there where you were really close to you, or did it just seem to be there?

(If really there:) Could you touch the (object) and (smell, or other appropriate sense) it?

5. The Origin of the Dream

"Tell me, where does a dream come from?"

"Where are dreams made, where do they come from?"

"Do they come from inside you or outside of you?"

"Who makes the dreams come out?"

"Is it you or is it somebody else?"

6. Location of the Dream

"While you are dreaming, where is your dream, where does it go?"

"Is it inside of you or In your room?"

(If the dream is in the head, in the thoughts, etc. (thus internal and not external) say:)

"If we could open your head while you are dreaming, if we could look into your head, could we see your dream?"

If not, why do you say that we could not see your dream?"

7. (If the dream is in the room on the wall, close to his eyes, under the bed, etc., say:)

"Is it only that the dream seems to be in your room or is it really in your room?"

If not really in room: "Where is the dream then?"

4. "If your mother is in your room while you are asleep and dreaming, can she also see your dream?"

Why not?

(If not): "How about me--could I see your dream if I were in your room while you were dreaming?"

8. Substance of the Dream

"What is a dream made of?"

"Is it made of paper?"

"Then, what is it made of?"

"Can we touch dreams?"

"Is a dream a thought or is it a thing?"

(If he says he didn't dream at beginning, return now to introduction and ask again to tell about a dream he had.)

10. (If the child still says he did not dream, ask him:)

"Let's make believe that you dream during the night about a monkey. Would it just seem that the monkey was there,or would the monkey really be there?"

"Let's make believe you dream about a monkey during the night. What would make you dream about thet, why would you have that dream?"

"Then do you know why we dream, why there are dreams?"

9. "When you had the dream about the (object), why did you have that dream? What made you have that dream?"

"Then do you know why we dream, why there are dreams?"

Scale Score

1. Know what a dream is.
2. Says picture of dog is not real
3. Dream object is not real
   a. partly aware of unreality of dream
   b. fully aware that dream is not real and consistent in saying this.
4. Dreams are not visible to others.
5. Dreams do not originate in the external physical world.
6. Thinks dreams may take place inside.
7. Sure dreams take place inside.
8. Dreams are not material things.
9. Dreams are caused in a purely subjective or immaterial fashion by the child himself.

# DREAM INTERVIEW SCORING

1 KNOWS WHAT A DREAM IS

+ YES, knows what a dream is
  can't have a dream if stay awake and don't go to sleep
  can have a dream if awake, but differentiates as daydream

2 PICTURE OF DOG IS NOT REAL

+ just a picture or something that looks like a dog
  real picture of a dog
  real dog, but can't bark or run Q2

- real dog, can bark and run

3a PARTLY AWARE OF UNREALITY OF DREAM unclear or inconsistent about dream object

+ Q 3a or 3b or 3c : one answer that dream object is not real

3b FULLY AWARE THAT DREAM IS NOT REAL fully clear that actions or objects of the dream are not really there

+ 3c pretend or look-like object
  3d just seemed to be there
  3a no - responses Q3

- 3c real object
  3d really there
  3a suggests place where object went: UNLESS object is really in existence

4 DREAM NOT VISIBLE TO OTHERS

+ no, mother can't see dream Q4
  no, I can't (ie E) see dream
  (+ if both are +, or if only one is answered and it is +)

5 DREAMS DO NOT ORIGINATE IN THE EXTERNAL WORLD

+ (if both a and b are +, or if only one is given but is +)
  a from you; from some part of the body; dreamland; God; heaven; or don't know if + on b Q5 (Where are dreams made, where do they come from?)

  b inside on Q 5 (Do dreams come from inside or outside?) unless has said God or dreamland in a.

- a from the night, from windows, d.k.

  b outside UNLESS God or dreamland in a

6 THINKS DREAMS MAY TAKE PLACE INSIDE

+ (if + on two of the following)

a head; you; mind; some part of body on Q6 (While you are dreaming, where is your dream, where does it go?)

b inside on Q6 (Is it inside you or in your room?)

c seems to be there on Q6 (Does it seem to be in your room or is it really there?)

d internal locus on Q7 (Where is your dream then?)

7 SURE DREAMS TAKE PLACE INSIDE

+ (Replies correctly to all questions about the location of the dream, where it takes place. May believe that dreams come from God or heaven, but if so, believes that the dream goes inside the body or head before its occurrance.)

8 DREAMS ARE NOT MATERIAL THINGS

+ a no concrete physical substance named on "What are dreams made of?"
b no-dreams made of paper
c no-touch dreams
d thought-thought or thing
e no-open head, see dream
f invisible or some similar response to "Why do you say you could see dream?"

- if d.k., yes, or maybe, or if any incorrect response to above.

9 DREAMS ARE CAUSED IN A PURELY SUBJECTIVE OR IMMATERIAL FASHION BY THE CHILD HIMSELF

+ you do, your mind, some stimulus event of child on Q "Who makes dreams come out?"
you on Q ("Is it you or somebody else?"
some explanation of having perceived or heard about the dreamed about object and some explanation of its having made an emotional impression on the child, or is said to be something the child is thinking about. A simple statement that the child has seen the dreamed about thing is inadequate.

- God makes dreams come and child has nothing to do with it

Name _____

Object Sorting Task

Equipment: Randomly arranged cluster of 3 infants, 3 fathers, 3 mothers, 3 boys, 3 girls (1 rubber, 2 identical cloth for each set)

1. "Put them in order, put the ones together that go together." (After grouping:) "Why do they go together?" (Require at least five groupings — record each group and reason group goes together.)

a. (If most groupings are associative:) "Put the ones that are the same together here."

2. (Human dolls are now collected and mixed. Two pieces of paper are set out.)

"Now make just two piles out of all the dolls. Put some of the dolls here and some of them there. Put all the ones that are the same, that go together, here. Put all the other ones that go together, that are the same, over here." (Record dolls in each group.)

a. (If child is uncertain or does not respond to above:)
"We're going to take all these dolls that are together and make two piles out of them. Let's take this boy doll and put it on the paper. Now put all the other ones that go with the boy on this paper. Put the other ones that go together on this paper over here." (Record dolls in each group.)

Non-verbal Scoring Procedure

All object sorts must be scored without reference to the child's verbalization. For spontaneous sorting, page 1, one credit is given for each sort. If "same" directions were given on page 1, one-half credit is given for each sort. When a child kept adding objects to the sort the final sort is scored unless regrouping occurred at very different times in the protocol as when the child completely resorts spontaneously. The following rules apply to spontaneous sorts.

Categorical. -- At least three objects must be in a group for it to be scored categorical. The following groups are scored categorical:

3 babies
3 girls
3 women
3 boys
3 men
4 women: 2 rubber and 2 plastic
4 men: 2 rubber and 2 plastic
5 children
6 children
5 adults
6 adults
5 females
6 females
5 males
6 males

Part-categorical. -- Two dissimilar same sex and age (e.g., plastic and rubber girl) is scored $\frac{1}{2}$ associative, $\frac{1}{2}$ categorical.

4 rubber children, scored $\frac{1}{2}$ descriptive, $\frac{1}{2}$ categorical
4 rubber adults, scored $\frac{1}{2}$ descriptive, $\frac{1}{2}$ categorical
2 plastic males and rubber male, scored $\frac{1}{2}$ identity, $\frac{1}{2}$ categorical
2 rubber women and plastic girl, scored $\frac{1}{2}$ identity, $\frac{1}{2}$ categorical

Collective. -- A collective sort is the making of a family group. In order to be scored collective a sort must include at least a mother, a father, and a child. It cannot include more than one set of adults.

Descriptive. -- A descriptive sort is one in which an obvious perceptual similarity exists between the objects. This dan be on the basis of color or materials. The following groups are scored descriptive:

All plastic dolls with or withour baby
All rubber dolls with or without babies
Dolls dressed in red checks together
Blond hair girl and blond hair boy
Brown hair boy and brown hair girl

Descriptive - continued

Brown hair man and brown hair woman
Pink plastic girl and pink baby

Identity. -- Identity groupings are those in which two nearly identical objects are put together. The following sorts are scored as identity:

2 rubber same sex and age dolls
2 same sex plastic dolls
2 rubber babies
Any doll alone which is sorted to be alone, not just left over

Scoring for the forced sort dichotomy is as above with the following exceptions:

Placement of the baby dolls should be ignored in a sex sort and scored categorical if all other dolls are by sex.

In age sort babies must be with children for categorical.

By sex or by age is scored categorical.

Scoring of Verbalizations

The procedure developed by Kohlberg was followed with the following exceptions:

An enumerative response is associative even if description of the dolls is included when there is no common attribute. For example, "This is blue and yellow, this is red and green." Or, "This is big and this is little."

When the child says the dolls are the "same" or "look alike" this is scored Identity.

When a child names a group "boys and men" or "ladies and girls" this is scored $\frac{1}{2}$ associative, $\frac{1}{2}$ categorical as it is not clear if male-female concept is present. This response ordinarily should be probed further.

Score Sheet

| | Non-Verbal | | Verbalization | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Associative | | | | |
| Identity | | | | |
| Descriptive | | | | |
| Collective | | | | |
| Categorical | | | | |
| Total | | | | |
| Weighted Score | | | | |

Sorting Scale

1. Makes some similarity groupings spontaneously or on request (1a).
2. Most groupings are not associational.
3. Includes all objects.
4. Includes all members of a class in more than 50% of spontaneous groupings.
5. Uses complementary classes in 2.
6. More than 50% of weighted groupings are true categorical concepts.
7. Scores 3 on class inclusion task.
8. Shifts from one system of classification in spontaneous groupings to another in forced sort, e.g., from sex groupings to age groupings.